

Studies Development Plan

FY 2003-2005

MINERALS MANAGEMENT SERVICE

Environmental Studies Program



Gulf of Mexico OCS Region
Environmental Sciences Section

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Final

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SECTION 1. Programmatic Overview

1.1. Introduction to the Region

In managing Outer Continental Shelf (OCS) activity, the Minerals Management Service (MMS) has two core responsibilities, safe offshore operations and environmental protection. Our safety goal is to ensure incident free minerals exploration and development on Federal Offshore Leases. Our environmental responsibilities are to ensure that all activities on the OCS are conducted with appropriate environmental protection and impact mitigation.

The MMS New Orleans Regional Office conducts all leasing and resource management functions on the Outer Continental Shelf (OCS) for the Gulf of Mexico and the Atlantic OCS areas, a total of 415 million acres in seven planning areas (see map in Section 1.2). The Gulf of Mexico OCS Region's (GOMR) three planning areas along the Gulf Coast contain 39 million acres under lease (as of 02-01-2001). There are 3,981 offshore production platforms active in the search for natural gas and oil on the Gulf OCS (as of 02-01-2001); these contribute significantly to the Nation's energy supply. Ten oil and gas lease sales were held in the Atlantic between 1976 and 1983. Forty-seven exploratory wells were drilled. Only five wells discovered hydrocarbons. These five wells were offshore New Jersey and were abandoned as non-commercial.

The Minerals Management Service (MMS) Environmental Studies Program (ESP) was established in 1973 as a means to gather information to support decision making for offshore oil and gas leasing. The program (then under the Bureau of Land Management) evolved with changes in the geographic areas of concern, in environmental issues, and in study priorities and policies. In 1994, the MMS Atlantic OCS Regional Office was closed and its responsibilities transferred to the Gulf of Mexico Region (GOMR). In the GOMR, the ESP addresses issues from prelease through postlease operations. In the Atlantic Region, the ESP has been limited to prelease descriptive and process-type investigations since there has been no production in that area.

The Gulf of Mexico is anticipated to remain the Nation's primary offshore source of oil and gas. Initiatives to emphasize the use of "environmentally friendly" natural gas further promote the production from the Gulf's gas fields. Advances in offshore technologies (e.g., directional drilling; deepwater structures such as sub-sea completions, spar, and tension-leg platforms; sub-salt prospecting; three-dimensional geophysical profiling; and down-hole instrumentation) ensure that exploration and development will continue in the Gulf for decades to come.

In 1992 the MMS entered into a partnership with the Louisiana State University (LSU) to establish the first Coastal Marine Institute (CMI). This partnership was developed as part of an initiative to cultivate new State-Federal cooperative agreements on environmental and socioeconomic issues of mutual concern. These projects are designed to help answer questions regarding the potential impacts from oil and gas and marine minerals activities.

The establishment of the Biological Resources Division (BRD), a division of the U.S. Geological Survey, in 1996, provided the MMS with new opportunities for partnership in biological

research. The BRD has procured and is conducting several studies for the GOMR. This partnership will continue and several projects are described in this plan anticipating the involvement of the BRD.

Because there has been a dramatic increase in deepwater oil and gas activity in the Gulf of Mexico, the MMS sponsored a deepwater workshop in April 1997. Conducted under a cooperative agreement with LSU, the workshop focused on physical oceanography and the environmental and sociological sciences. The recommendations and issues identified in the workshop proceedings (Carney, 1997) are being used to design the studies needed by the MMS in the preparation of environmental assessments, other NEPA documents, and deepwater regulations to oversee oil and gas activities. A follow-up workshop to discuss the results of these studies is planned for Spring 2002.

1.2. Map of the Planning Area



1.3. Projected OCS Activities

1.3.1. Gulf of Mexico Region

Since the Gulf of Mexico Region is the most active OCS area, all activities associated with oil and gas exploration and production in U.S. are occurring. These activities

include leasing, exploration, development, removal of platforms, and laying of pipelines. A new five-year (2002 – 2007) environmental impact statement is currently being written which will include one lease sale per year in each of the central and western planning areas. The first lease sale in the eastern planning area since 1988 was held in December 2001. Two additional eastern planning area lease sales are proposed in the next five years in the same area as Lease Sale 181.

The number of rigs drilling in deepwater in the Gulf of Mexico rose to a record high of 40 in December 2000. Seven of the 40 wells were being drilled in water depths greater than 1500 m. While the price of oil and gas has decreased during 2001, the success of recent discoveries continues to support increasing future activity in deepwater. In addition, 26 structures and 53 subsea completions are in place presently and more are expected. Exploration continues on the shelf as a result of improved seismic data and drilling capabilities.

The number of production platforms should continue to increase in deepwater while the continental shelf should remain static or decrease. Approximately 120 structures are installed annually on the shelf and 110 structures are removed. Pipeline segments are installed between connections and can be any length. Last year, the installation of approximately 400 pipeline segments was approved.

Recently, a Record of Decision was published which will permit the use of Floating Production, Storage, and Offloading Systems (FPSO) in the Gulf of Mexico. The system allows for the storage of oil on the drill ship and the transfer of the oil to other vessels for transport to shore. This eliminates the need for pipelines, emplacement of a “permanent” structure, and removal of the structure.

1.3.2. Atlantic Region

The last lease sale within the Atlantic Region occurred in 1983. On November 17, 2000, the interests in the last remaining 8 natural gas and oil leases active in the Federal waters offshore North Carolina were relinquished. There are now no oil and gas leases in existence off the Atlantic Coast.

1.4. Identification of Information Needs

With the dramatic increase in offshore oil and gas activities in deepwater of the Gulf of Mexico, environmental and socioeconomic information needs have increased as well. The Gulf of Mexico Region has approximately 100 ongoing studies divided among all areas of interest. We are proposing studies in the following topics to meet our information needs.

1.4.1. Physical Oceanography

The Region has already conducted numerous studies along the continental shelf. We held a workshop in September 2000 to plan the acquisition of information in deepwater. An exploratory study is in the procurement process and results from the study will be used to plan future research in FY 2004 and beyond. Physical oceanographic processes do not

stop at the Exclusive Economic Zone (EEZ) and a full understanding requires inclusion of information from Mexican waters. We are proposing a joint investigation that crosses the EEZ.

Of interest is the recent observation that Sperm Whales congregate along the 1000-meter isobath. This may be in response to localized upwelling or some other physical oceanographic process. Understanding where and why sperm whales aggregate will better enable MMS to protect them from oil and gas activities.

Recently completed studies have increased our database on physical oceanographic parameters in the northeastern Gulf of Mexico, in particular the DeSoto Canyon. The data can now be used to advance the understanding of physical oceanographic processes along the slope and shelf through application of numerical modeling techniques.

1.4.2. Atmospheric Sciences

Two air emissions data collection activities are almost complete. One is in the Breton Sound area and one that is Gulfwide. A modeling effort of SO₂ and NO_x is underway for Breton Sound. A repeat of the Gulfwide inventory is planned for the year 2005 to coincide with data collection activities by other State and Federal agencies. As a part of modeling efforts, meteorological information is required, and at this time meager for the Gulf. We are considering the use of satellite imagery to enhance the data set.

1.4.3. Fates and Effects

In the mid-1970s, the first major offshore environmental survey in the Gulf of Mexico was conducted in response to questions about the effects of oil and gas activities on the continental shelf. This study, "MAFLA", examined physical, chemical, and biological parameters along the Mississippi, Alabama, and Florida shelf. Parts of the Mississippi and Alabama shelf were revisited in the late 1980's for similar analyses as part of "MAMES". We are proposing a third visit to the same areas as examined under "MAFLA" with the intent to investigate the environmental effects of increased activities along the shelf over the past 25 years.

1.4.4. Biology

A major study of the deep-sea benthic community is in the third is yielding interesting information about the trends and distribution of benthic fauna. We are continuing to support a program to monitor the Flower Gardens. Chemosynthetic communities have been studied extensively by several researchers and it is time for a synopsis of what is already known. Also, within deepwater, the characterization of non-chemosynthetic, hard bottom communities, including the coral *Lophelia*, is an information need.

1.4.5. Protected Species

A major interagency study was conducted with the National Marine Fisheries Service (NMFS) during calendar year 2000, which resulted in the observations of Sperm Whales

congregating along the 1000-meter isobath. We were continuing this effort with NMFS and completed several cruises during the summer of 2000. Unfortunately, some issues arose that have led to the formulation of a new cooperative agreement with Texas A&M University using the same researchers.

Besides marine mammals, other protected species may be affected by oil and gas activities. Along the Gulf coast, there are protected plovers (birds) and beach mice. In the event of an oil spill, these species could be impacted both directly and through damage to their habitat. We are proposing a study into the effects of oil on these species.

1.4.6. Social Sciences and Economics

The Gulf of Mexico Region has a very active program in social sciences and economics. During FY 2002, one focus will be on extending and/or synthesizing studies that are concluding. Results from the industry-wide labor-needs questionnaire will be analyzed and a revised survey will be developed. A study of industry dynamics in the Gulf will be followed by one more focused on worldwide change. Information on ports collected by several studies will be synthesized into an analysis of the socioeconomic effects of OCS-related port activity.

The State of Louisiana has expressed concerns about the value of OCS-related activities and infrastructure in its coastal wetlands and about the need to better address the cumulative socioeconomic effects of the program on the State. These concerns will be addressed by several studies. Finally, as OCS activity moves into the western Gulf of Mexico, Texas is experiencing more of the program's effects. Planned studies will reflect this shift.

Under NEPA, it is the responsibility of MMS to protect artifacts on the seafloor, specifically shipwrecks. We are proposing a study to conduct a National Register of Historic Places evaluation of submerged sites. There are numerous possible WWII freighter and tankers that have been identified in remote sensing records. We are also proposing to further investigate and identify these shipwrecks and explore the possibility that they may serve as biological habitat in deepwater.

1.4.7. Gas Hydrates

Interest in gas hydrates has waxed and waned over the past 30 years. With the spike in natural gas prices in early 2001 and interest in alternative fuel sources, interest is again focused on gas hydrates. If hydrates do become an economically viable resource, environmental assessments will require an understanding of the location and distribution of the resource. The MMS joined the Chevron Texaco Hydrate Joint Industry Project, which will conduct research into gas hydrates in the Gulf of Mexico using funding from the Department of Energy (DOE). The DOE is funding \$11 million and industry is adding \$2 million to study and characterize gas hydrates in the Gulf of Mexico. The project is focusing on hydrates as a geohazard as well as a resource.

Evaluations of deepwater blowouts have raised the question of whether the formation of hydrates would affect the rising oil plume. A recent field experiment did not result in observations of hydrate formation. One explanation is that nucleation is a critical step in hydrate formation, but little is understood about the nucleation process. We are proposing a laboratory study to investigate and model the nucleation process of hydrate formation.

1.4.8. Other Studies

During the preparation of Environmental Impact Statements, the risks or impacts of activities associated with oil and gas extraction must be evaluated. We are proposing several studies to assist with the estimations of spill occurrences and support vessel usage, this includes the risk of vessel collisions.

The MMS and its predecessor have funded close to \$200 million dollars worth of research in the Gulf of Mexico. Much of the information is only available in MMS reports. We are proposing two syntheses of the physical and geological knowledge of the Gulf of Mexico to be published in book form and more available to the public.

SECTION 2.

2.1. Introduction

The following sections focus on the proposed studies for FY 2003, FY 2004, and beyond. Most of the ongoing studies in the Gulf of Mexico Region can be found on the web at:

<http://www.mms.gov/eppd/studies/index.htm>

Additional information about recent MMS funded deepwater research, in particular research cruises, can be found at:

<http://www.gomr.mms.gov/homepg/regulate/envIRON/deepenv.html>.

Websites subject to current availability.

2.2 Profiles of Regional Studies Proposed and on the FY 2003 NSL

Gulf of Mexico Region Proposed Studies and Ranking for FY 2003

Page #	**	Title	Ranking
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15	SE	Demographic Consequences of the Offshore Petroleum Industry	4
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19	SE	Study to Conduct National Register of Historic Places Evaluations of Submerged Sites on the Gulf of Mexico Outer Continental Shelf	6
21	PO	Synthesis of Physical and Geological Oceanography Knowledge from 1970 to Present	7
**	PO = Physical Oceanography FE = Fate & Effect BIO = Biology PS = Protected Species SE = Social & Economic OT = Other		
***	Rank 1 = highest		

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Western Gulf of Mexico

Type: Competitive Cost Reimburse

Title: *Deepwater Program: Survey of Deepwater Currents in the Western Gulf of Mexico*

Period of Performance: 3 Years

Description:

Background Leasing in the western Gulf of Mexico extends to deepwater near the US-Mexico border in water depths exceeding 2,000 m. Unfortunately, this is an area with limited oceanographic and current data. The presence of these leases implies a potential for exploration by the oil and gas industry, which currently includes over 100 exploratory wells in the Alaminos Canyon and Port Isabel areas alone. The western Gulf is the boundary where Loop Current rings and eddies strongly interact with the seafloor and dissipate. Also, significant amounts of drifting material in the Gulf lands in this region. In order for MMS to fulfill its regulatory function proactively more current data in this area is definitely desirable. This proposed study would collect current and hydrographic measurements in the western Gulf that will allow identification of processes present in the region and help design future oceanographic studies. Successful completion of this study will also ensure that our understanding of the deep western Gulf is ahead of future exploration and development trends.

Objectives The objectives of this study are 1) to conduct a survey of deepwater currents in the western Gulf of Mexico using moorings to increase our limited database in this region; 2) to improve our understanding of the regional oceanography to help design future studies, assist calculation of horizontal and vertical trajectories of release oil and its dispersion, and 3) provide an oceanographic framework to help with interpretation of biological observations.

Methods Deploy several mooring lines across the western slope (surface to bottom) at selected depths. Hydrographic data will also be collected during the deployment, servicing, and recovery cruises. Since the intended measurements extend beyond the US-Mexico we will involve Mexican researchers in this project.

Products An expanded current and hydrographic database in the western Gulf of Mexico, identification of relevant processes and recommendation for future oceanographic studies in this region.

Importance to MMS This study will fill an important data gap with huge implications for physical and biological understanding of the deep Gulf. An important result of this study is the availability of data to Industry for design of structures and operations in this region.

Date Information Required: This study must be completed in two years after award.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico

Planning Area(s): Western and Central Gulf of Mexico

Type: Competitive Procurement

Title: *Deepwater Program: Characterization of Gulf of Mexico Deepwater Hard Bottom Communities with Emphasis on Lophelia Coral*

Period of Performance: 2 Years

Description:

Background Although the vast majority of the bottom in deep-water areas of the Gulf of Mexico is comprised of soft sediments (sand, silt, and clay), it is well known that there are some locations with significant areas of hard bottom, particularly associated with the tops of salt diapirs. These hard bottom areas are generally created through biogenic precipitation of carbonate by chemosynthetic bacteria. Carbonate deposits can subsequently become exposed above surrounding slope sediments providing substantial substrate for attached animal communities to develop. One of the fundamental missions of the Minerals Management Service Environmental Sciences Section is to identify and consider the protection of new and unknown sensitive biological habitats. At least two major communities that include significant accumulations of *Lophelia* corals have been described. It is not known if these remarkable coral habitats are common in other parts of the Gulf or if they are extremely rare. Mitigation procedures exist to minimize impacts to topographic features and pinnacle features in the shallower waters of the continental shelf. Chemosynthetic communities have also been studied extensively and are protected by an NTL and mitigations. The vast soft bottom areas of the Gulf are currently being investigated under the current study 30991, *Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology*. Deep-water hard bottoms were not included in the objectives of this ongoing study. A dedicated program to investigate deep-water hard bottom communities is the next logical step for MMS following early investigations of continental shelf topographic features and more recent investigations of pinnacle trend features and chemosynthetic communities.

Objectives The purpose of this study is to: 1) Utilize results from previous related work to define and select sampling areas that represent probable areas of exposed hard bottom that is not necessarily associated with active hydrocarbon seepage 2) design and implement submersible survey and sampling techniques that will characterize the types of non-chemosynthetic megafauna communities that live on deep-water hard substrate outcrops, and 3) attempt to determine the environmental conditions that result in the observed distribution of high density communities that could be considered important and sensitive to impacts from oil and gas development activities (particularly extensive areas of *Lophelia* coral).

Methods Similar to the recent chemosynthetic community studies, this study would require the use of a manned submersible for the fine scale observation and sample collections required to describe new, high-diversity biological communities.

Products Written and digital reports and maps detailing the distribution of observed deep-water hard bottom communities with special emphasis on coral communities, analyses of collected samples, synthesis of resulting data sets, and recommendations. Predictive methodologies should be proposed for evaluating the potential sensitive nature of hard bottom on the continental slope in other areas. Study results should include the evaluation of current mitigations and avoidance of chemosynthetic communities and consider typical avoidance of hard bottom areas appearing on 3D seismic surface anomaly geophysical maps.

Importance to MMS Sensitive biological features other than chemosynthetic communities in deep water have not yet been addressed by MMS. The ROV Survey NTL 2000-G04 does address the effectiveness of current mitigation measures to a large extent, but there is still little known about the complexity and distribution of hard bottom communities in the deep Gulf that are not directly related to chemosynthetic communities.

Date Information Required: Information will be used as soon as it is available to develop reasonable and prudent mitigation measures (if necessary) to protect deep-water sensitive biological features not currently specifically included in NTLs or mitigations related to chemosynthetic communities.

Revised date: 10/17/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: Analysis of OCS-Related Institutional Issues in Coastal Gulf of Mexico

Period of Performance: 2 Years

Description:

Background New super ports for deepwater are being considered for Galveston and Mobile. To stay competitive, the ports of Morgan City and New Iberia have requested that deeper channels be dredged to allow them to fabricate bigger platforms. In Corpus Christie, water demands by the petrochemical industries are threatening the amount available for residential lawns. Each sector of the petroleum industry—transportation, fabrication, drilling, etc.--is dynamic, continuously reorganizing, reconfiguring, and redistributing and, as underscored by the traffic problem on Louisiana Highway 1, these changes create local conditions that are relevant for MMS management and assessment.

The Gulf of Mexico Region is large, complex, and varied, stretching across five states and including eighty counties and parishes. Scoping is a NEPA process intended to identify the relevant concerns of stakeholders and the general public. MMS conducts scoping in many ways, from soliciting formal comments from governmental institutions to holding public hearings in the affected area. While these activities provide useful input, the information is not invariably inclusive and sufficient. When an issue energizes communities, MMS receives detailed input. However, this is the exception. The GOMR management and the assessment process would benefit from more detailed information, on a wider range of topics, from a wider range of the institutions that are affected by the OCS program.

Objectives This study has two objectives. First, it will identify geographic foci of OCS-related industry activities that may create local issues and conditions salient to MMS management and analysis and evaluate the kinds of institutions and infrastructure that may be of concern. Second, in these focal areas for the institutions and infrastructure of concern, it will collect and analyze expert evaluations of local conditions, issues and trends and the role OCS-related industry has played in these. Third, it will develop a system for updating this assessment of local conditions and concerns.

Methods This study will be divided into four phases. First, the study team will work with MMS staff to develop the parameters of the collection effort that will identify likely concerns (e.g., demands on transportation systems, water supply, and health services), focal areas (e.g., ports, heavily involved communities, concentrations of specialized businesses), and the institutions to be addressed (e.g., port authorities, mayor's offices, chambers of commerce, health services). Second, again working with MMS staff, the study team will develop and test the institution lists,

informant lists, and protocols that will be used to gather the data. Third, the team will collect and analyze protocol-based data on: (1) a range of economic, social and environmental trends, changes and issues, (2) on the role of petroleum-related activities in these trends, changes and issues, (3) on expectations about future trends, changes, and issues, and (4) on the role petroleum-related activities are expected to play in this future.

Products A research plan including a description of the foci, a list of institutions, institutional contacts, and associated protocols; an annotated bibliography, and a two-volume study report. Volume one will summarize and analyze the observations, concerns, and predictions of representatives of selected governmental and quasi-governmental entities involved OCS-related activities. Volume two will report these observations, concerns and predictions in more detail. A design for a follow-up study will be conducted five years later.

Importance to MMS This study should expand the effective participation of stakeholders in the environmental assessment process, a major goal of MMS. It will provide MMS management with an analysis of relevant local issues that may be emerging, including an assessment of the relationship of these issues to MMS activities. It will also support better analysis of effects at the local level by providing expert testimony on current conditions, trends and issues, as well as local insights into their causes and consequences.

Date Information Required: Results of this study will support the next multi-sale environmental assessment. The information is needed as soon as possible. While the Environmental Assessment Section indicates that in mid-2003 would be optimal, report completion will likely be later. The results of this study will support the agency's 5-Year programmatic EIS and all GOMR environmental assessments when they become available.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Planning Area

Planning Area (s): Central and Western

Type: Competitive Procurement

Title: Demographic Consequences of the Offshore Petroleum Industry

Period of Performance: 2 Years

Description:

Background Traditional socioeconomic assessments emphasize demographic effects as the cause of other socioeconomic effects. The GOMR situation is much more complex than this classic “boom and bust” pattern. The petroleum industry has played a major role in the Gulf for over one hundred years, the offshore industry for over fifty. The area’s early petroleum development followed the classic “boom and bust” pattern but, in the last few decades, the offshore industry has not produced the here-today-gone-tomorrow boomtowns of that earlier era. The result is a complicated picture from which cumulative effects cannot be easily separated.

Still, demographic effects remain important for MMS assessments for three reasons. First, the OCS program’s cumulative demographic effects have been substantial for many Texas and Louisiana communities. These need to be identified and summarized. Second, because demographics is a vector for other socioeconomic effects, this summary will provide the base for a wider agency analysis of cumulative impacts. Third, the National Research Council review of the GOMR studies program argues that the GOMR is a “natural laboratory” for researching the nature and causes of the industry’s social and economic effects. This study will identify factors that make the demographic consequences of offshore petroleum unique. This study may also help communities anticipate demographic effects of the program.

Objectives This study will document and assess the cumulative demographic effects of the petroleum industry on communities and regions in Texas and Louisiana and assess the OCS program’s contributions to these effects. The study will analyze changes to population size, structure (e.g., age, sex), dynamics (fertility, morbidity), racial and ethnic composition, migration (e.g., magnitude, characteristics, geography), and commuting (e.g., magnitude, characteristics, geography). The study will assess the factors that affect changes, paying particular attention to how, and to what degree, the petroleum industry has played a role. This analysis will identify the specific regions and communities that have experienced demographic effects of the program. Finally, for affected locations, this study will document other community- and region- level effects associated with these changes.

Methods Study strategies and analytical techniques are substantially constrained by information availability. This study will use standard demographic techniques and data sources (such as county- and tract-level U.S. Census data) to measure such variables as population growth, composition, ethnicity, in- and out-migration, commuting, and ethnicity and to assess such causal factors as labor demand. However, research strategies that rely on consistent data or techniques

across time and space can not effectively analyze all questions raised by this project. When data availability prevents hypothesis testing, analysis will address questions that support and challenge hypothesized relationships. The analysis will stress comparisons, focusing on Texas and Louisiana and using Oklahoma as a standard source of third examples. Other comparisons may be appropriate for specific questions (e.g., national trends or reported findings of relevant research elsewhere). Analysis will be based on publicly available data (e.g., census data, annual state reports), primary documents (e.g., unpublished manuscripts, telephone books, county reports), and published literature (e.g., local and regional histories, earlier academic analyses, newspaper articles). Limited regional or local archival research and discussions with key persons may be necessary. Cumulative effects will be reported for Texas and Louisiana, for oil involved areas within these states, and for selected communities.

Products Technical reports, databases, and literature reviews.

Importance to MMS State of Louisiana reviews of MMS EISs consistently raise the issue, noting that these sale-level documents do not adequately address the OCS program's true burdens to the state, which are cumulative. This study is a major step towards addressing this concern.

NEPA requires an assessment of cumulative effects. However, because of the GOMR petroleum industry's size, complexity, wide yet uneven geographic distribution, and longevity, identifying and assessing its cumulative socioeconomic effects is a substantial undertaking inappropriate for sale-level EISs. This study will provide the documentation and analysis from which MMS will begin to construct a cumulative socioeconomic impact analysis of the GOMR OCS program.

Date Information Required: Findings from this study will be incorporated in GOMR socioeconomic impact assessments, as they become available.

Revised Date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Western and Central Gulf

Type: Inter-Agency Agreement

Title: Gulf of Mexico Passive Air Quality Monitoring

Period of Performance: 1 year

Description:

Background Over the past several years, MMS has been involved in a number of air quality related studies to ensure that onshore air quality impacts from OCS sources are correctly determined. For example, recent air quality analyses (e.g., photochemical modeling) conducted as a part of the Gulf Coast Ozone Study (GCOS) indicated that high concentrations of ozone occasionally occur well offshore in the OCS. There is concern that these modeled offshore concentrations may be the result of inaccurate modeling rather than actual elevated concentrations offshore. Currently there are no direct measurements of ambient air quality parameters (e.g., ozone) in the OCS, and thus, it is not possible to assess the validity of the analyses. Recent court action has upheld the change in the ozone and particulate matter, air quality standards. This has increased the emphasis on air quality along the Gulf coast. Specifically, there are a number of counties and parishes that are likely to be designated non-attainment for ozone. In addition, the new regional haze rules which focus on visibility in Class I Air Quality areas, such as Breton, further increases the need for air quality monitoring in the OCS.

Recently, the U.S. Environmental Protection Agency (EPA), Region 6 has documented the suitability of a passive air quality monitoring program. This program involves the use of specially treated filters that can be exposed to the ambient air for a variety of time periods, and are easily deployed. EPA, Region 6 is currently planning to deploy a passive ozone monitoring network, which will include a couple of sites in gulf state waters off the coast of Texas. The project would be implemented from July through September of 2002.

Objectives The primary objective is to gather air quality data, specifically ozone, and possibly oxides of nitrogen, and sulfur dioxide, in the OCS region, in conjunction with the EPA, Region 6 passive air quality monitoring program, scheduled from July through September of 2002. This data can be used to characterize the ambient air quality in the OCS. In addition, the data can be used in air quality analyses and in validating the results of the modeling. A secondary objective is to develop a database that can be used to improve the understanding of atmospheric chemical processes on the emissions from OCS sources.

By deploying passive monitors in the OCS in conjunction with the EPA, Region 6 program, concurrent monitoring data will be collected on-shore as well as off-shore. In addition, MMS will benefit from EPA's experience with this type of monitoring, which in part can be used to

determine the effectiveness of this type of monitoring in the OCS. Further, by using an inter-agency agreement, MMS can expedite the contracting process, which will ensure that the monitoring in the OCS is concurrent with monitoring onshore.

Methods The methods for collecting the air quality data will conform to the procedures for passive air quality monitoring established by the EPA, Region 6. The MMS will assist the EPA, Region 6 in locating suitable platforms in the OCS, where operators are willing to deploy the sampling devices. The passive sampling devices consist of a chemically treated filter which is housed in a solid cylindrical polymeric body (2cm diameter x 3 cm long). The cylindrical polymeric body is clipped to the inside of a PVC pipe cap (4 inch, schedule 40). The PVC pipe cap is mounted on a pole or other suitable structure. The filters are exposed to the ambient air for a temporal duration long enough to provide for the minimum detection level for the pertinent chemical analysis. For example, ion chromatography is used for the ozone related filters and the minimum detection level is 10 ppb. Typically, the filters are exposed for a 12-hour duration, which is more than adequate for meeting the detection levels.

Products The principal products of this project will be a data report and an electronic data file. The report will include a description of the various OCS monitoring sites, the sampling procedures, the analytical procedures, and data handling. In addition, the report will include a presentation of the monitoring data in tabular and graphical displays, and discussions of any unusual measurements which may not be attributable to OCS sources. The electronic data file will be provided in a format (e.g., MS-Access) to be specified by MMS staff.

Importance to MMS MMS needs to gather air quality data in the OCS, which is non-existent, to improve the assessment of the impact of offshore emission sources on coastal air quality and Federal Class I areas. This will assist in ground-truth for modeled representations of offshore air quality thus supporting better decision-making regarding future commitment of resources in the regulation of offshore air quality.

Date Information Required: There is currently an urgent need to begin collecting this data before more air quality impact analyses are conducted which appear to indicate problems in the OCS region that can not be validated.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Cooperative Agreement

Title: Study to Conduct National Register of Historic Places Evaluations of Submerged Sites on the Gulf of Mexico Outer Continental Shelf

Period of Performance: 2 years

Description:

Background Federal agencies have, under Section 106 of NHPA, the responsibility to consider the effect of agency actions on significant archaeological resources. While MMS has adhered to Section 106 by requiring industry to conduct remote sensing surveys and avoid potential targets, no testing has been performed to ascertain the effectiveness of this requirement or to determine if the remote sensing targets that are selected have any real archaeological significance. The knowledge gained from this study will allow the MMS to be less restrictive on development by more accurately identifying how significant resources appear in the remote sensing record. Finally, the MMS imposes on industry a more rigorous survey requirement in areas where it believes resources may be located. By identifying the actual locations of those resources, it should be possible to relax those requirements in many areas, resulting in significant savings in survey costs to the oil and gas industry.

Objectives The objective of the study is to ground-truth, positively identify, and assess the National Register status of five to ten selected targets (at least one deep wreck requiring ROV inspection is anticipated) identified in industry-submitted remote sensing surveys. It is anticipated that the present proposed contract would be the first “pilot project” of an on-going effort to assess for significance remote sensing targets that appear likely to be related to an archaeological site. New potential targets are reported constantly to the MMS as the oil and gas industry continues to conduct survey of the seafloor. At present, these sites range in depth from 20 feet to over 6,000 feet.

Methods The objectives of the study will be achieved through investigating a list developed by MMS archaeologists of potential sites that will be provided to the contractor. Test sites will be selected from among the 210 (as of 7/1/02) sidescan sonar targets already supplied by industry that are suggestive of shipwrecks. The criteria for selection will include the appearance of the acoustic image, the association of magnetic anomalies, and the report of an historic shipwreck in the target vicinity. Testing would be performed by marine archaeologists applying a variety of techniques including remote sensing, diving, and ROV inspection. The projects will likely consist of extensive photographic documentation and limited excavation and artifact collection for identification purposes, as well as historical research. These projects will not hamper the

leasee's ability to develop their lease since potential targets will continue to be avoided until such time as they can be tested for significance.

Products A technical report.

Importance to MMS This information is needed to begin to assess the effect of the OCS program on significant cultural resources. A backlog of well over 210 untested sites already exists (not all of these will require testing since many are clearly modern). Ideally, fieldwork would begin summer 2003. Additionally, the assessment of shipwrecks for NRHP eligibility could result in immediate relief for the oil and gas industry.

Date Information Required: The information will be used as soon as it is gathered.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulf of Mexico

Type: Competitive

Title: Synthesis of Physical and Geological Oceanography Knowledge from 1970 to Present

Period of Performance: 3 Years

Description:

Background The Minerals Management Service and Industry have supported many studies in physical and geological oceanography of the Gulf of Mexico since 1970. However, this knowledge is mostly contained in reports and other literature which is either not easily available to researchers or documents that can not be referenced. This vast amount of knowledge represent ten's of millions of dollars of investments by all involved.

Objectives The objective of this study is to synthesize in a single source the knowledge accumulated since 1970 in the Gulf of Mexico in the form of extensive review papers so it is available to professional and nonprofessionals.

Methods Prepare extensive and detailed review papers that are peer reviewed in physical and geological oceanography in the Gulf of Mexico.

Products Two books containing the review papers.

Importance to MMS This study will allow the foremost experts in physical and geological oceanography in the Gulf of Mexico to review and summarize the knowledge since 1970. Such synthesis will help plan future studies, evaluate the Agencies contributions, and help define our path for the future of the Environmental Studies Program.

Date Information Required: This study will produce two books in a one year period.

Revised date: 10/22/2002

2.3 Profiles of Regional Studies Proposed for FY 2004 and Beyond

Gulf of Mexico Region Proposed Studies for FY 2004 and Beyond

Page #	**	Title
25	PO	<i>Deepwater Program:</i> Physical Oceanography of the Slope and Rise (POSAR)
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31	FE	Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf
33	FE	Distribution of Natural Seepage in the Gulf of Mexico
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39	SE	<i>Cumulative Effects Series:</i> Demographic Consequences of the Offshore Petroleum Industry
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43	SE	An Institutional History of the Minerals Management Service, Gulf of Mexico OCS Region (Development of the Offshore Regulatory Regime)
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47	SE	<i>Deepwater Program:</i> World War II Shipwrecks
49	OT	Year 2005 Gulf-Wide Emissions Inventory Study
51	OT	Gulf of Mexico 8-Hour Ozone Modeling Analysis
53	OT	Data Gap and Satellite Remote Sensing Data Retrieval for Air Quality Modeling in the Gulf of Mexico Region
55	OT	<i>Deepwater Program:</i> Increasing the Understanding of Gas Hydrates for Model Calibration

57	OT	Risk of Vessel Collisions with Facilities and Proximity to a Shipping Fairway
59	OT	The Environmental Risks of Offshore OCS Waste Subsea Disposal
61	OT	Improved Environmental Data Concerning Support Vessel Usage by the OCS Oil and Gas Industry
** PO = Physical Oceanography FE = Fate & Effect BIO = Biology PS = Protected Species SE = Social & Economic OT = Other		

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: *Deepwater Program:* Physical Oceanography of the Slope and Rise (POSAR)

Period of Performance: 6 Years

Description:

Background Initial observations of deepwater currents in the Gulf by a Minerals Management Service study in the mid 1980's revealed weak to moderate currents driven by Topographic Rossby Waves (TRW). These currents were essentially barotropic below ~1,000 m and varied at time scales of 15 days. However, observational and modeling studies similar to the recently completed LATEX or the ongoing Northeastern Gulf of Mexico Physical Oceanography Program have not been conducted in the deep Gulf. Recent data (Minerals Management Service and proprietary records) have shown that strong currents, 1-2 knots (50-100 cm/s), occur in the deepwater of the Gulf of Mexico. The processes responsible for causing such strong flows are not known. Also, the Loop Current and its eddies are very active in the deep Gulf.

Known processes that need to be studied included the interaction of Loop Current eddies with the bottom topography. Generation and evolution of eddy-like features, topographic steering of flows, mid-water jets, inertial currents, and wind-driven flows. Also, more information is needed concerning the currents near the Mississippi Canyon where newly separated eddies begin their westward voyage across the deep Gulf. The bottom relief on the slope and rise is extremely rough and can drive different physical processes that are little understood or studied.

Objectives The objectives of this study are: 1) to deploy arrays of moorings to collect oceanographic observation across the entire water column; and 2) to analyze and interpret these measurements using existing theories relevant to the oceanographic processes identified. Among potential processes to be examined are: interaction of LC eddies with the topography; generation and evolution of cyclonic features; topographic steering of flows; and wind driven circulation.

Methods This effort will deploy moorings and conduct oceanographic cruises at suitable time intervals to resolve relevant temporal and spatial scales. Remote sensing data will also be employed to examine the synoptic thermal and sea surface topography of the area. Detailed surveys of important features will be conducted to investigate their characteristics. Because of its complexity and relevance, a planning workshop was conducted on September 2000 in New Orleans. This workshop helped focus the study objectives and design.

Products A final report and CDs containing raw data.

Importance to MMS The results from this study will provide information regarding the interactions of LC eddies with the topography; generation and evolution of eddy-like features; topographic steering of flows; wind driven circulation; and mid-water column jets. The study will support other ongoing studies by identifying the relevant physical processes and increase the understanding of them and their interactions, and by providing data for numerical model verification. These results should provide MMS with values of the seasonal and annual variabilities of the physical processes studied. The results will also be available for completing risk assessments used by MMS for preparation of NEPA documents. These results will also help understand sediment transport and recently discovered erosional mega-furrows (Bryan et al., 2000) and as ancillary information for analysis of biological data.

Date Information Required: The participants of the physical oceanography session of the MMS “Workshop on Environmental Issues Surrounding Deepwater Oil and Gas Development” (Carney, 1997) recognized this project’s priority and recommended it begin after completing the “Deepwater Physical Oceanography Reanalysis and Synthesis of Historical Data” and “Study of Physical Processes Over the Slope and Rise Using Numerical Models” studies. However, the participants of the September 2000 Workshop recommended starting this study after completion of an exploratory study which is in planning.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulf of Mexico

Type: Competitive Cost Reimburse

Title: *Deepwater Program: Near Synoptic Hydrographic Surveys of the Gulf of Mexico*

Period of Performance: 4 Years

Description:

Background Understanding the deepwater Gulf environment requires a holistic, synoptic, and geographically broad view, however, most MMS studies seldom go beyond the U.S. Exclusive Economic Zone. So we find ourselves working now in a severely data depauperate area. An area particularly affected, is the hydrographic characterization of the deep Gulf. The only available hydrographic data is from the early 1970's. To complicate matters, some parameters observed during these early surveys have been discarded as faulty, e.g., oxygen. This proposed study would conduct hydrographic surveys of the entire Gulf to produce data for those parameters now absent, and update those available by using state-of-the-art technologies. This proposed study will also produced a near-synoptic view of the Gulf by employing two survey vessels.

Objectives The objective of this study to conduct two (winter and summer) hydrographic surveys of the Gulf of Mexico using two vessels to produce a near-synoptic and state-of-the-art hydrographic database.

Methods Conduct hydrographic casts of the entire water column (surface to bottom) over the entire Gulf of Mexico using two vessels. The parameters to be measured include standard CTD, oxygen, nutrients, and tracers.

Products An updated hydrographic database, a near synoptic view of the circulation, fields of relevant parameters, indication of mixing through the use of tracers, and vertical profiles and horizontal maps of derived quantities. Technical reports and scientific papers will also be produced by this study.

Importance to MMS This study will fill an important data gap with implications for understanding the biology of the deep Gulf. An important result of this study is the opportunistic comparison with previous surveys to detect potential changes in the salinity and temperature fields of the deep Gulf.

Date Information Required: Information from this study will be used for deepwater assessment as soon as it is available.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Central

Type: Competitive

Title: *Deepwater Program:* Central Gulf of Mexico Midslope Physical Oceanography Study

Period of Performance: 3 Years

Description:

Background The GulfCet Program was supported by MMS to determine the distribution and abundance of cetaceans along the continental slope in the northern Gulf of Mexico and to help the MMS assess the potential effects of deepwater oil and gas exploration and production on marine mammals in the Gulf of Mexico. Results of GulfCet have shown sperm whales to be generally found in mid to lower continental slope regions over 1000 m total water depth. There is some indication that in general sperm whales may be found in conjunction with the edges of warm-core rings that pinch off from the Loop Current. Some of these warm core rings impinge on the continental slope in the north central Gulf of Mexico, and the resulting interaction with slope topography could produce upwelling events that may enhance productivity and prey abundance. However, recent unpublished MMS data also indicate that high speed deep currents exist in continental slope regions of the north Central Gulf of Mexico where sperm whales thrive. These high speed currents vary on spatial scales that appear to be considerably smaller than those generally associated with warm core rings, and may be due to physical oceanographic processes of smaller scales in deep water over the continental slope.

Sperm whales have been sighted with exceptional frequency and consistency during the past decade along the continental slope of southeastern Louisiana, in a small area of 1000 meters total water depth between approximately 28.24N 89.18W and 28.57N 88.84W. Little or no information is available on currents in this region, and it is not known if seasonal upwelling occurs here. By examining physical oceanographic parameters throughout the water column, we can determine if midwater currents transport water into this area from the west northwest direction of the Mississippi Canyon region, or if the flow into and through the region is primarily along the 1000 m isobath, as has previously been suggested, along a southwest to northeast axis. By focusing on this small area it may be possible to detect the presence and strength of small, deep, highly ageostrophic eddies that are thought to play a part in high speed current events elsewhere on the central Gulf of Mexico slope, as well as to determine local circulation and whether this small region is susceptible to seasonal upwelling.

Objectives The study objects are to: (1 advance our understanding of the physical conditions in a small Central Gulf of Mexico midslope region which attracts sperm whales and at which they have consistently been sighted, (2 determine the temperature and salinity time series fields and

simultaneous speed and direction of flow into and out of this region, and (3) determine if and when local upwelling occurs which could bring nutrient-rich waters into this region, and to determine if deep eddies as small as 30-70 km and/or other processes of similar scale may be affecting circulation along the 1000-meter isobath.

Methods This study is expected to use three moorings with current meters, temperature and salinity sensors at 10m., 500m., 800m., and 950 m. to monitor and measure physical parameters in the area of high sperm whale concentration along and near the 1000-meter isobath between 28.24N 89.18W and 28.57N 88.84W, and two similar moorings along and near the adjacent 1500-meter isobath but with current meters, temperature and salinity sensors only at 1450m, 1000m, and 800m, in order to determine if upwelling occurs. Temperature, salinity, and current data from these moorings will be analyzed using standard time series analysis techniques including scale analyses and these analyses will be interpreted in support of the stated objectives of this study. Data and a final report of findings will be provided to MMS.

Products Data and a final report of findings will be provided to Minerals Management Service.

Importance to MMS This study will support future or concurrent MMS sperm whale studies by providing information on conditions in a region where sperm whales thrive and are frequently observed. The question of what physical oceanographic conditions exist within the target region of this study was raised at the POSAR (Physical Oceanography of the Slope and Rise) workshop, and further study of this specific region was suggested at that time. Sperm whales are an endangered species and they have been consistently observed in unusually heavy abundance within this region. Understanding physical conditions in this area will allow the MMS to better understand the sperm whale habitat, the effects of oil and gas operations on sperm whales, and to meet our responsibilities under the Marine Mammal Protection Act of 1972 (MMPA) and the Endangered Species Act of 1973 (ESA).

This study will complement MMS data collection in the upcoming MMS Exploratory POSAR study as well, and may partially overlap with the Exploratory study in data collection period. These data will provide information on smaller scales and in a region of the Central Gulf of Mexico eastward of the study area for Exploratory POSAR and in shallower midslope waters.

Date Information Required: This study will complement MMS data collection in the upcoming MMS Exploratory POSAR study as well. These data will provide information on smaller scales and in a different region of the Central Gulf of Mexico than will Exploratory POSAR.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: Long-term Effects of Oil and Gas Activities on the Mississippi and Alabama Shelf

Period of Performance: 3 Years

Description:

Background The opportunity to study the long-term effects of oil and gas development on the Mississippi-Alabama-Florida shelf is now possible. Baseline measurements were made during extensive studies in the mid-1970s. It is now possible to evaluate the effects of oil and gas activities on this dynamic shelf and compare the results with those collected almost 30 years ago. An initial study was conducted by the State University System Institute of Oceanography from 1974-1975 and completed by Dames and Moore in 1976-1977. The general findings were that the shelf area was relatively pristine with some influence from the Mississippi discharge. Part of the study area was revisited in the late 1980s as part of the MAMES project. Oil and gas activities have increased along the shelf since the initial study and it is time to revisit the area and evaluate whether these activities have resulted in cumulative contamination of the continental shelf.

In contrast, the Florida shelf, which was also sampled during the MAFLA study, has not been affected by oil and gas activities. This is an opportunity to compare a region that has had ever increasing oil and gas activities with a region that has not. Of course, other activities may have altered the pristine Florida shelf, but these could not be attributed to oil and gas activities, which have been restricted for the past 30 years.

Objectives The objectives of this study are to: 1) collect and analyze water, sediment, and biological samples from the Mississippi-Alabama-Florida shelf using the same parameters as previous studies and 2) compare the results with the studies from the 1970s and 1980s to see if there has been any degradation to the marine environment as a result of oil and gas activities.

Methods A single sampling cruise of designated sites located in the same place as those from the previous MAFLA study. The same parameters would be analyzed, including trace metals, petroleum hydrocarbons, benthic and fish composition, and general hydrodynamic information. The results would be compared to the previous study and an evaluation of the effects (or lack of effects) would be made.

Products A final report.

Importance to MMS The MMS is constantly faced with defending oil and gas activities as environmentally sound. This study would provide data where activities have been occurring for

decades and where previous studies were performed. The information could be used to support future development in as yet undeveloped areas where it can be reasonably demonstrated that no long-term effects from oil and gas activities occur.

Date Information Required: The information is needed within the next few years to support future development in as yet undeveloped areas.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: Distribution of Natural Seepage in the Gulf of Mexico

Period of Performance: 1 Year

Description:

Background As industry moves operations to deepwater, the Minerals Management Service needs to more fully understand slicks from natural seepage in order to effectively distinguish and analyze spill risk associated with deepwater operations. The slick patterns can also be mapped. By identifying the natural slick patterns in areas where surface slicks are common, the Minerals Management Service can better discern between natural conditions and a contamination problem. For example, in shallow water, when an unknown slick is sighted, the Coast Guard notifies the Minerals Management Service and operators in the vicinity check their operations for leaks. Sometimes, industry must shut in their operations until the leak source is found. By knowing if there is a natural source of slicks in the area, the Minerals Management Service will be able to better respond to any spill or non-spill event.

In addition, we need information on the extent that seepage is contributing to the hydrocarbon contamination in deepwater sediments and surface waters. The volume of oil that naturally seeps into the environment is often referenced to put the volume of a spill into perspective. However, the values used are only rough estimates and a more precise value would lead to better information being communicated to the public.

Objectives The objectives of the study will be to 1) map the occurrence of slicks on the surface, 2) relate the surface signature to bottom features, and 3) make better estimates of the volume of oil seeping into the Gulf of Mexico.

Methods The study will use a combination of several remote sensing tools to verify the origin and quantities of natural seepage. Remote sensing tools can include high frequency fathometer surveys, 3-D seismic seafloor amplitude mapping, and satellite imagery. Direct surface and subsurface sampling may be necessary to calibrate the remote observations.

Products A report and 3-D digital maps linking surface slick locations with seafloor natural seep activities.

Importance to MMS This information is frequently requested by the public, is critical to our EIS cumulative analysis of sources of hydrocarbons, and will assist district staff in their accident investigation responsibilities.

Date Information Required: The information will be used as soon as it is available.

Revised date: 2/25/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: *Deepwater Program:* Gulf of Mexico Chemosynthetic Community Information Search and Literature Synthesis

Period of Performance: 1 Year

Description:

Background Chemosynthesis and chemosynthetic communities have been among the most intensely studied subjects since their discovery in the Galapagos Rift in 1977. The discovery was considered by many the most important marine ecology finding in the 20th century, and the phenomena are still under study. In late 1984, researchers discovered chemosynthetic communities in dredge and trawl tows on the Gulf of Mexico continental slope. Subsequent submersible dives and various photograph samples and analyses confirmed the chemosynthetic nature of the tubeworms and molluscs; the magnitude, faunal composition, and spatial variability; and some general relationships with geochemical and physiographic features.

The Minerals Management Service recognized the importance of these communities and the implications to the management of the oil and gas industry. In December 1988 the Minerals Management Service issued a Notice to Lessees that required "... avoidance or protection of chemosynthetic communities and avoidance of shallow hazards ..." The MMS funded the first study, the Chemosynthetic Ecosystems Study (CHEMO I) in 1990. This was a two-year field study concentrating on community descriptions and other determinations to address the most immediate management needs. Investigators deployed manned submersibles to allow for precision navigation, photography, sampling and observation, but it restricted the operations to a maximum of about 900m depth. In addition to the work on chemosynthetic animals and bacteria, they investigated associated heterotrophs, biochemical and physiological activity, and methods for geophysical community detection. The 1995 study, "Change and Stability in Gulf of Mexico Chemosynthetic Communities" (CHEMO II) expanded greatly on the CHEMO I database. The MMS recognized that there were still few data on ecological interactions, temporal stability, change and senescence, and the biogeochemical support system. So CHEMO II addressed nonbiotic and biotic questions to understand the conditions necessary for community establishment and maintenance, and some aspects of the life histories of the animals. CHEMO II was also restricted to 900m. During "Gulf of Mexico Continental Slope Habitats and Benthic Ecology," the DSV *Alvin* was deployed in part to observe several deeper (>1,000m) chemosynthetic community sites.

Many other recent chemosynthetic community-related studies have been conducted in the Gulf by independent investigators funded by NSF, ONR, NOAA, and industry, and others have been proposed for new funding.

Objectives The Minerals Management Service needs an updated overview of present knowledge on chemosynthesis to support NEPA analysis, and provide for future studies planning. The general purpose of this effort is to gather, organize, and update information into a single concise report which describes the ecosystems, provides an understanding of the processes that drive it, and estimates sensitivity to anthropogenic activity with emphasis on the oil and gas industry. The specific objectives of the study will be to develop a structured, computer-searchable database and a synthesis document. The computer-searchable database will incorporate existing literature citations, abstracts of important reports, and listings of relevant data and ongoing investigations. The synthesis document will provide a summary of available information by topics selected to give a concise, succinct understanding. The document will provide input into the preparation of MMS NEPA documents and identification of data gaps that could be filled with future investigations.

Methods Information will be accumulated through reviews of journal papers, published and unpublished reports and data, personal communications, and the location of any other reliable sources. The database will be developed using accepted and user friendly technologies.

Products Written synthesis report(s), computer-searchable database, and maps.

Importance to MMS At present, data and information sources are widely scattered. They reside in Government reports, journals, popular accounts, and unpublished manuscripts and databases. The project products will aid in updating NEPA documents, provide the MMS and the public with a condensed, well-organized, and updated review of many aspects of the communities, and identify data gaps for the planning of potential new investigations.

Date Information Required: Products should be available in 2005 for future NEPA processes and project planning.

Revised date: 2/28/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico Region

Planning Areas: Gulfwide

Type: Interagency Agreement

Title: Probability of Contact of Spilled Oil with Federally Listed Beach Mice and Piping Plover

Period of Performance: 1 Year

Description:

Background Special attention to endangered species (for the purpose of this analysis, piping plover and the Alabama, Perdido Key, Choctawhatchee and St. Andrew beach mice) is mandated in many environmental documents prepared by MMS. Under the Endangered Species Act, major environmental documents require Biological Opinions from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

Objectives To model for possible contact of spilled oil with critical habitat of piping plover. To model for contact of spilled oil behind the front dune of beach mouse habitat (including critical habitat).

Methods To use a model for determination of probability of a spill inundating the piping plover critical habitat or inundating the area behind the fore dune where endangered beach mice reside. If such probability were high the physiological impacts and pungent odor of oil on bird and rodent proxies for the endangered species would be tested. The impacts of the proxies to oil relative to other potential summarized in the term “natural variation.”

Products A report on the probability of contact of oil with habitat of beach mice and piping plover.

Importance to MMS Testing the relative gravity of potential oil spills versus naturally occurring impacts to beach mice and piping plover is essential because these organisms are endangered but may not be threatened by future OCS oil and gas activities. For OCS oil and gas activities, knowledge of the importance of oiling to endangered species could mean the difference between lease sales/permitting and prohibition/moratoria.

Date Information Required: As soon as possible. Piping plover and listed beach mice are evaluated in the majority of ongoing environmental document development and rigorous information is needed immediately to detect any possible threats to the species from heavy oiling and any benign effects from low or moderate levels of oiling.

Revised date: 3/19/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Planning Area

Planning Area (s): Central and Western

Type: Competitive Procurement

Title: *Cumulative Effects Series:* Demographic Consequences of the Offshore Petroleum Industry

Period of Performance : 2 Years

Description:

Background The petroleum industry has played a major role in the GOMR for over one hundred years, the offshore industry for over fifty. In Texas and Louisiana most of the industry's socioeconomic effects are cumulative, and do not result from particular lease sales. The National Research Council review of the GOMR studies program argues that this situation makes the Gulf Region a "natural laboratory" for researching the nature and causes of the industry's social and economic effects. This study is one of a series designed to document and assess the long-term and cumulative socioeconomic effects of the offshore petroleum industry.

Demographic impacts have long been considered the key to the assessment of socioeconomic impacts. Early onshore petroleum industry activities in Texas and northern Louisiana followed the classic "boom and bust" impact assessment scenario. Each new discovery brought a rush of workers and their families, potential workers and their families, investors, shop keepers, and hangers-on, creating busy towns almost overnight. As exploration ended and production trailed off, these towns declined, often into nothingness. The coastal Texas and Louisiana offshore petroleum industry has not produced the boomtowns of its earlier era. Nevertheless, its cumulative effects have been substantial for localities and the States.

Objectives The goal of this study is to document and assess the cumulative demographic effects of the petroleum industry on Texas and Louisiana and to assess the OCS program's contributions to these effects. The study will analyze changes to population size, structure (e.g., age, sex), dynamics (fertility, morbidity), racial and ethnic composition, migration (e.g., magnitude, characteristics, geography), and commuting (e.g., magnitude, characteristics, geography). The study will assess the factors that affect changes, paying particular attention to how, and to what degree, the petroleum industry has played a role. The study will address the years 1900 through 2000 (the period of industry presence); it will emphasize the years 1940 through 2000 (the period of offshore operations and improved data availability). While this study will document changes over time and space, its emphasis is on the analysis of these changes and of the contribution of the petroleum industry and the offshore petroleum industry to these changes over time and space.

Methods Study strategies and analytical techniques are substantially constrained by information availability. For example, pre-WWII data are less extensive and consistent than post-war sources. This study will use standard demographic techniques and data sources (such as county-

and tract-level U.S. Census data) to measure such variables as population growth, composition, ethnicity, in- and out-migration, commuting, and ethnicity and to assess such causal factors as labor demand. However, research strategies that rely on consistent data or techniques across time and space can not effectively analyze the questions raised by this project. Instead, the research will take a more ad hoc approach. Relevant changes and/or patterns of change will be identified within time periods, States, counties, groups of counties, and possibly communities. However, the measurement of these changes and patterns and the assessment of their causes will often vary from period to period and place to place. Data availability will likely prevent hypothesis testing. Instead, analysis will often consist of answers to questions that support and challenge hypothesized relationships. The analysis will stress comparisons. This and other cumulative-effects studies in this series will focus on Texas and Louisiana and use Oklahoma as a standard source of third examples. Other comparisons may be appropriate for specific questions (e.g., national trends and reported findings of relevant research elsewhere). Analysis will be based on publicly available data (e.g., census data, annual State reports), primary documents (e.g., unpublished manuscripts, telephone books, county reports), and published literature (e.g., local and regional histories, earlier academic analyses). Limited regional or local archival research and discussions with key persons may be necessary. Cumulative effects will be reported for Texas and Louisiana, for oil involved areas within these States, and possibly for selected communities.

Products Technical reports, databases, tables and literature reviews.

Importance to MMS State of Louisiana reviews of MMS EISs consistently raise the issue, noting that these sale-level documents do not adequately address the OCS program's true burdens to the State, which are cumulative. This study is one of a series that will address this concern.

NEPA requires an assessment of cumulative effects. However, because of the GOMR petroleum industry's size, complexity, wide yet uneven geographic distribution, and longevity, identifying and assessing its cumulative socioeconomic effects is a substantial undertaking inappropriate for sale-level EISs. This study and the others in this series will provide the documentation and analysis from which MMS can construct a cumulative socioeconomic impact analysis of the GOMR OCS program.

This analysis will improve agency assessments of sale-level effects by addressing the issues of industry vs. non-industry effects, offshore vs. onshore effects, the variations in types and distributions of effects. The study will examine concepts relating to fiscal and infrastructure impacts, human and social capital, opportunity cost, and community change that are commonly applied to extractive industries.

Date Information Required: Findings from this study will be incorporated in GOMR socioeconomic impact assessments as they become available.

Revised date: 2/27/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Central and Western

Type: Competitive Procurement

Title: The Changing Roles of Houston and New Orleans in the Offshore Oil and Gas Industry

Period of Performance: 1 Year

Description:

Background The GOMR offshore petroleum industry has been undergoing almost continuous reorganization since the oil price bust of the mid-1980s through such processes as merges, acquisitions, joint ventures, downsizing, outsourcing, new bookkeeping and cost control procedures, and technological efficiencies. The industry move into the deepwater GOM and its continuing globalization seem to reinforce its reorganizational trends. In the GOM, one significant outcome of these changes has been the concentration of more of the industry in Texas, particularly in the Houston area, at the expense of New Orleans and such smaller centers as Lafayette, Louisiana.

Objectives This study will analyze the ongoing concentration of industry activities in the Houston area, identifying the types (e.g., functions) and numbers of entities that have relocated, the year(s) they relocated, the place from which they have moved, and the reasons for their relocation. It will examine these reasons in terms of the organizational, economic, and/or business considerations emerging from the industry reorganization. After identifying locational advantages of Houston related to the industry reorganization, the study will consider Houston's role given future industry trends, particularly of the internationalization of the deepwater industry. The study will address the question of Houston's locational advantages compared to oil centers elsewhere in the world.

Methods Literature review, analysis of existing data, and discussions with knowledgeable individuals. The analytical base of this project would be a business locational study. It will then identify the specific factors (e.g., transportation, available services) that led to this decision and analyze the role that changes in the industry had in creating or emphasizing these factors.

Products Study reports, literature review.

Importance to MMS This study will address information MMS information needs in two areas. First, the role of Texas in the OCS industry is expanding and this study will support MMS information needs in the Western GOM. Second, the last decades of industry reorganization have redistributed industry activities within the GOMR while linking them more closely to industry deepwater activities worldwide. This case study will provide insights into the nature and magnitude of these changes.

Date Information Required: Study information will be used in environmental assessments and decision-making as it becomes available.

Revised date: 3/6/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Area Wide

Type: Cooperative Agreement (U.S. Park Service, New Orleans Office)

Title: An Institutional History of the Minerals Management Service, Gulf of Mexico OCS Region (Development of the Offshore Regulatory Regime)

Period of Performance: 1 Year

Description:

Background MMS's regulatory regime constitutes a substantial part of the environment in which the offshore petroleum industry must operate. Regulations that the agency established and maintains obviously constrain industry actions, but they have other important effects as well. For example, the offshore pioneer "Doc" Laborde, writes in his memoir that, for wildcatters, one attraction of federal offshore lands was their lack of ownership disputes. Early results of the MMS-funded history project suggest that area-wide leasing was the single-most factor in transforming the Gulf into the birthplace of the offshore industry. Several studies have noted that State of Louisiana law moved the early industry toward resource conservation. Early results of the MMS history suggest that its environmental regulations were a catalyst for environmental consciousness for industry management and workers. The MMS leasing and regulatory regime is a significant vector in dynamics of the GOMR offshore industry.

The U.S. Park Service had produced many institutional histories for parks, preserves, and regional offices. Through these, the Service has advanced the use by Federal agencies of institutional history as a tool for describing policy decisions, clarifying their goals, and assessing their consequences. The Service is currently considering such a history for Jean Lafitte National Park and Preserve. A joint effort between the Service and MMS to develop two institutional histories would create savings for both projects.

Objectives To describe and document the establishment of the MMS GOM Region, its organization and its operations. The study will identify a sample of regulations and procedures that have played a significant role in the evolution of the offshore industry. The study will describe and document the development of these regulations and procedures.

Methods The primary method of institutional history is the collection and review of agency documents. This study will include limited discussions with key persons, and review of unpublished materials from the ongoing history study. The institutional historian will be an employee of the U.S. Park Service; MMS will provide some of the interviews and will coordinate this project with other MMS efforts, such as its history project.

Products A technical report; a more popular work describing the work of the GOMR office.

Importance to MMS The MMS has played an important role in shaping the development of the offshore oil industry and mitigating its effects. Its regulatory structure has been critical to an understanding of industry behavior. Nevertheless, the agency's role is little known, little appreciated, and poorly documented.

Date Information Required: The results of this study will be used when it becomes available in MMS assessments and future study planning.

Revised date: 3/4/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulf wide

Type: Competitive Procurement

Title: Scoping Support: An Assessment of OCS-Related Trends and Concerns

Period of Performance: 2 Years

Description:

Background Scoping is a NEPA process intended to identify the relevant concerns of stakeholders and the general public. MMS conducts scoping in many ways, from soliciting formal comments from governmental institutions to holding public hearings in the affected area. While these activities provide useful input, the information is not invariably as inclusive and detailed as originally envisioned by NEPA. GOMR assessments must address a large, complex, and varied affected area. As the Louisiana Highway 1 testimony illustrates, when an issue energizes communities, they do provide detailed input. However, this is the exception. The GOMR assessment process would benefit from more detailed information, on a wider range of topics, from a wider range of the institutions that are affected by the OCS program.

Objectives To improve the NEPA scoping process by providing the Gulf of Mexico Region and Headquarters with an analysis of OCS-related trends, effects and issues from the perspective of State and local institutions affected by the OCS program. To provide MMS generally with useful information about State and local concerns.

Methods This study will include all GOMR States and be updated every five years. Data collection will include limited literature and document review but will emphasize face-to-face, protocol-based discussions with appropriate representatives of governmental and quasi-governmental entities involved with assessment, management, and/or regulation of OCS-related activities or that are significantly affected by these activities. Representatives will be selected from State-level entities, from major cities in the study area, from a selection of counties and communities substantially involved or affected by offshore activities, and from other substantially involved institutions, such as port authorities. The protocol will elicit the entities' views on: 1) a range of economic, social and environmental trends, changes and issues, 2) on the role of petroleum-related activities in these trends, changes and issues, 3) on expectations about future trends, changes, and issues; and 4) on the role petroleum-related activities are expected to play in this future. Working with MMS, the research team will develop a list of entities and individuals to be included and develop and test the protocol. The team will then conduct the discussions and report the findings.

Products A two-volume study report. Volume one would summarize and analyze the observations, concerns, and predictions of representatives of selected governmental and quasi-

governmental entities involved OCS-related activities. Volume two would report these observations, concerns and predictions in more detail.

Importance to MMS This study should expand the effective participation of stakeholders in the environmental assessment process, a major goal of MMS. It will support better analysis of effects at the local level by providing expert testimony on current conditions, trends and issues, as well as local insights into their causes and consequences. This, also, is an ongoing agency goal. Finally, the study will support MMS's D76 process by contracting for activities that can best be done by the private sector and, thereby, making government functions more efficient.

Date Information Required: Results of this study will support the next multi-sale environmental assessment. The information is needed as soon as possible. While the Environmental Assessment Section indicates that in mid-2003 would be optimal, report completion will likely be later. The results of this study will support the agency's 5-Year programmatic EIS and all GOMR environmental assessments when they become available.

Revised date: 2/28/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: *Deepwater Program: World War II Shipwrecks*

Period of Performance: 2 Years

Description:

Background Some 40 merchant vessels were sunk on the OCS by German submarines (U-boats) during the Second World War, with most of the casualties occurring in 1942 and 1943. One of the U-boats that patrolled the Gulf, the U-166, was recently located during a pipeline survey in over 1500 m of water in the Central Gulf of Mexico. Because these vessels have been on the seafloor for over 50 years, and because of the significant role played by them and their crews in an important period of American and world history, they are likely eligible for the National Register of Historic Places. In addition, an Executive Order signed January 19, 2001, States that “the United States will use its authority to protect and preserve sunken State craft of the United States and other nations, whether they are located in the waters of the United States, a foreign nation, or in international waters.” Sunken State craft include any warship, naval auxiliary, or other vessel armed or operated by the United States or a foreign State that sunk while on government, noncommercial service. Since many of these vessels carried U.S. Navy gun crews and were chartered by the United States government to transship oil and fuel for the war effort, many are likely to be considered “State craft.” Over 100 lease blocks, many in deepwater, have been set aside as “shipwreck high probability areas” requiring more intensive surveys by the oil and gas industry to locate these vessels since most of their locations were not precisely reported at the time of their loss. Over the past ten years, however, over a dozen possible World War II freighters and tankers have been identified in remote sensing records obtained during lease block and pipeline surveys.

Objectives The objective of this study is to ground-truth, positively identify, and assess the National Register status of these wrecks in order to properly manage this resource according to MMS’ responsibility for archaeological properties under Section 106 of the National Historic Preservation Act. A second objective involves assessing the known wrecks in deepwater for their properties as a biological habitat. Since these wrecks have laid on the seafloor for nearly 60 years, they can serve as a laboratory to assess the viability of deepwater artificial reefs.

Methods The primary methods of data collection will be by historical records research and ROV inspection. Some diving may be required on wrecks in less than 130 feet of water to better obtain information that would aid in identifying the vessel. Records research will focus on obtaining information that will aid in assessing the National Register eligibility of each wreck and in assessing its status as a protected State craft.

Products A final report.

Importance to MMS Under Section 106 of the National Historic Preservation Act (NHPA) Federal agencies are required to assess the effects of their permitted or funded activities on historic resources that may be eligible for the National Register of Historic Places. We cannot assess the potential effects of our actions on these resources unless we know where they are. Further, under Section 110 of the NHPA agencies are required to identify, evaluate and nominate to the National Register any historic properties under the jurisdiction or control of the agency. While “sunken State craft” are not specifically under the jurisdiction or control of the MMS, they are under the jurisdiction and control of the United States government and have the potential to be affected by our permitted and funded actions. A secondary benefit of this study to the MMS is that an analysis of the biological communities associated with these large, steel-hulled vessels in deepwater will provide information regarding the feasibility of converting abandoned deepwater oil and gas structures into artificial reefs at depths below the phototropic zone.

Date Information Required: Study information will be used immediately in environmental assessments and decision-making as it becomes available.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Western and Central Gulf of Mexico

Type: Competitive Procurement

Title: Year 2005 Gulf-Wide Emissions Inventory Study

Period of Performance: 3 Years

Description:

Background The collection and compilation of an emissions inventory is one of the tasks that MMS conducts to assure coordination of air pollution control regulations between OCS offshore sources and sources onshore (as per Section 328 of the 1990 FCAAA). Additionally, MMS regulations require MMS to provide States with emissions inventory data for OCS sources. This study will provide an emissions inventory of OCS sources for the year 2005. The emissions will include, at a minimum, estimates of carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter and hydrocarbons. These air pollutants influence the ambient concentration of photochemical smog and regional haze.

The 1990 Federal Clean Air Act Amendments (FCAAA) specifies that States are to prepare periodic emission inventories every three years, starting in 1996. These inventories are used to determine how well States are progressing in controlling emissions and in turn improving the air quality. The emission inventories are also used to conduct air pollution dispersion modeling, especially for those regions that are having difficulties in controlling emissions and/or improving air quality. There are a number of such regions along the coast of the Gulf of Mexico that are using these periodic emission inventories to address their emissions and/or air quality difficulties. To date these regions have had to use the 1992 emissions inventory developed for OCS sources. Shortly, with the completion of the Gulf-wide Offshore Activity Data System (GOADS) project, MMS will be able to provide these regions with an updated year 2000 emissions inventory. Although the year 2000 emissions inventory of OCS sources promises to provide an improved estimate in emissions from the OCS, the year 2000 does not correspond to one of the onshore periodic emissions inventory (e.g., year 2002). The next opportunity for MMS to develop an emissions inventory commensurate with an onshore periodic emissions inventory will be for the year 2005.

Objectives The purpose of this study is to develop a year 2005 emissions inventory of OSC sources. A Year 2005 emissions inventory will be commensurate with an onshore periodic emissions inventory. Since, it is likely that many of the regions along the coast of the Gulf of Mexico will still be having difficulties in controlling emissions and/or improving air quality in 2005, the year 2005 emissions inventory will be used to conduct modeling. Thus, the collection and compilation of an emissions inventory for OCS sources in 2005 provides MMS with the

opportunity to enhance its assurance of coordinating air pollution control regulations between offshore and onshore sources.

Methods A contractor will be used to collect and compile surveys and activity data from OCS facilities. Facilities include any installation (e.g., production platforms) or device having the potential to emit any air pollutant. In addition, emissions from any vessel used to support a facilities operation shall be considered part of the facility. The surveys and activity data will be collected using the MMS's emissions activity software. The contractor will quality assure the surveys and activity data, and notify MMS of any survey or data problems. MMS will work with OCS facility operators to resolve survey or data problems and then forward the corrected information to the contractor.

Products The contractor shall provide the MMS with electronic files of the quality assured survey and activity data collected from OCS facilities. In addition, the contractor shall provide the MMS with a quality assured emissions inventory in an electronic format as required by MMS's emissions activity software.

Importance to MMS The new ozone standard and regional haze regulations recently promulgated by EPA will require States to use a year 2005 emissions inventory for developing air pollution control regulations. MMS must provide States with suitable emissions on OCS activities to allow States to develop strategies for controlling emissions of air pollutants that adversely impact coastal areas.

Since the 1992 emissions inventory is outdated and obsolete, MMS has not been able to fully meet their obligation to States. In addition, although the year 2000 OCS emissions inventory will provide States a more up to date and improved estimate of OCS emissions, MMS needs to provide emission inventories that are contemporary with similar emission inventories for onshore sources. In this way, MMS can meet its obligation to States. In addition, MMS can use the OCS emissions inventory to support Environmental Impact Statements and Assessments. Further, to assure coordination of onshore and offshore air pollution regulations, MMS can use the OCS emissions inventory to assess the need for additional emission controls in the OCS.

Date Information Required: A contractor needs to be ready to start the collection and compilation of survey and emissions activity data on January 1, 2005. In order to accommodate this start date for the collection and compilation phase of the study, it is anticipated that six months lead-time will be needed. During this lead-time, the contractor will finalize a work plan, conduct at least two workshops to educate OCS facility operators in responding to the surveys and logging emissions activity data. A workshop would be held for each of the Western and Central Planning Areas in a convenient location (e.g., Houston, New Orleans).

Revised date: 3/13/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: Gulf of Mexico 8-Hour Ozone Modeling Analysis

Period of Performance: 3 Years

Description:

Background The 1990 Clean Air Act Amendments (1990CAAA) directed the MMS to conduct a study to determine the contribution of sources in the Outer Continental Shelf (OCS) to onshore ozone non-attainment areas. The Gulf of Mexico Air Quality Study (GMAQS) (completed in August 1995) met this requirement. GMAQS estimated the contribution air pollution emissions from OCS activities had upon the formation of 1-hour ozone in the then existing non-attainment areas of Houston, Beaumont and Baton Rouge.

Recently the Environmental Protection Agency (EPA) promulgated a new national ambient ozone standard based upon an 8-hour average. Therefore, the GMAQS, which only addressed the 1-hour ozone standard, no longer meets the 1990CAAA directive, and references to the GMAQS results are not applicable to current air quality requirements. This study will meet the 1990CAAA directive by addressing OCS sources contribution to onshore 8-hour average ozone. In addition, this study will use the results of a number of related studies, as well as improvements in photochemical, modeling techniques that have occurred since the GMAQS was completed in 1995. Relevant studies that will be used include: the year 2000 Gulf-wide emissions inventory, the Boundary Layer Study of the Central and Western Gulf of Mexico, the Breton Aerometric Monitoring Program, and the Breton NO_x/SO_x modeling study. Improved modeling techniques include the use of a new model, selection criteria and modeling protocol, new meteorological and chemical transport models, and a new, emissions, modeling system. Additionally, this study will determine if the ozone formation in the non-attainment areas is NO_x or VOC limited. This is of great importance to MMS, since NO_x is by far the air pollutant emitted most by OCS sources.

Products The products from this study will include electronic data files of the modeling inputs and output in a format stipulated by MMS and a final report, which quantifies the contribution OCS sources make to onshore 8-hour ozone non-attainment areas.

Methods The contractor shall use the new model, selection criteria and modeling protocol to recommend the combination of meteorological, chemical transport and emissions models to use for the study. Upon approval from MMS, the contractor will assemble the necessary input data. These data include existing onshore and offshore emissions inventories, and onshore and offshore meteorological data to sufficiently depict the pollutant transport processes in the Gulf of Mexico Region (GOMR). Concurrently, the contractor shall review periods of relatively high 8-hour average ozone concentration in existing and/or potential non-attainment areas in the GOMR

for modeling episodes. The contractor shall focus this review of potential modeling episodes on the period from 1999 to 2001. This will maximize the utility of the existing emissions and meteorological data. Once MMS has concurred on the episodes to be modeled, the contractor shall initiate the modeling protocol. The first major tasks will be executing the emission and meteorological models to generate the inputs for the chemical transport (i.e., photochemical) model. Once these models have been successfully executed and the resulting photochemical modeling inputs deemed satisfactory, the contractor shall proceed with the photochemical modeling.

The study requires using the existing onshore and offshore emissions inventories, and onshore and offshore meteorological data to sufficiently depict the pollutant transport processes in the GOMR. Primarily, the existing emission inventories and meteorological data will be used for this study. Photochemical modeling is performed to determine the degree to which OCS activities impact onshore O₃ and NO₂ concentrations. This information will be used so that decisions can be made as to how best to target emission control strategies.

Importance to MMS This study allows MMS to meet the 1990CAAA directive of determining what, if any, impact emissions from OCS sources have on O₃ non-attainment. In addition, this study will provide a framework for making decisions about where and which emissions should be targeted for controls to reduce current or foreseeable significant impacts. Further, the information obtained will support cumulative impact analyses for NEPA documents prepared to support GOMR OCS programs.

Date Information Required: The 8-hour ozone National Ambient Air Quality Standard went into effect on September 16, 1997. It established a three-year baseline data collection period that was completed in 2000. The 1-hour ozone standard is used in the Gulf of Mexico Air Quality Study (SAI, 1995). This 1-hour ozone standard will still apply to those areas that have not achieved the 1-hour standard. The 8-hour ozone standard will apply everywhere else. Therefore, a new ozone analysis is needed as soon as possible to allow the States to prepare and submit their air pollution control plans to the U.S. EPA.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: Data Gap and Satellite Remote Sensing Data Retrieval for Air Quality Modeling in the Gulf of Mexico Region

Period of Performance: 3 Years

Description:

Background Currently, MMS is conducting air quality and meteorological modeling to investigate the impact from the OCS emission sources on the air quality in the Breton Class I area. This is a complex project. In model simulations, the initial state of the atmospheric variables is to be accurately defined. However, there is lack of routine observational data to define this atmospheric state in the Gulf of Mexico Region. These data are very sparse, or near non-existent in the Gulf of Mexico region. Yet these data are crucial for improving air quality and meteorological modeling systems. The accuracy of the model outputs strongly depends on the observational data. Satellite remote sensing can be used to fill this data gap by providing useful information on sea state and atmospheric conditions and characteristics; it can be used to derive the meteorological variables such as wind, temperature, moisture, ocean current, wave heights, and sea surface temperature. These data may also be obtained from buoy measurements. For instance, the Advanced Very High Resolution Radiometer (AVHRR) is on board the NASA polar orbiting satellite with 1 Km spatial resolution in five wavebands. This capability can be used for monitoring of surface and atmospheric conditions. Data can be used to produce analysis fields for numerical modeling or to identify fire and smoke. Surface wind can be obtained from a scatterometer. Data can be retrieved from GOES images for verifying the model performance.

In summary, it is proposed to gather additional data from remote sensing and buoy measurements, process data, analyze data, and perform data assimilation for air quality and meteorological modeling in this study.

Objectives The objectives of this study are: 1) to demonstrate the feasibility and capability of the satellite remote sensing for retrieving the meteorological variables and sea state conditions or using buoy data for improving air quality or meteorological modeling system; 2) to understand the atmospheric process such as sea-breeze circulation in the coastal region in the Gulf of Mexico region; 3) to define the sea state and the state of atmospheric conditions and to collect the available data from various sources for the purpose of demonstration; 4) to make comparisons with the observational data; and 6) to make recommendations for the future study regarding the capability of using remote sensing data.

Methods Use buoy, scatterometer, and satellite remote sensing data to derive the atmospheric state or sea state variables and characteristics for improving air quality and meteorological modeling systems.

Products Databases and a summary report.

Importance to MMS Routine meteorological observations to define the vertical structure of the atmospheric conditions are expensive and also practically non-existence in the Gulf of Mexico region, especially in the deepwater environment. MMS urgently needs these data for improving air quality and meteorological modeling systems or to assess the environmental impacts of the offshore operations and to evaluate the associated risk of safety operations. The data can also be used for oil spill application.

Date Information Required: There is an urgent need to gather these data, since the air quality and meteorological modeling is an ongoing project. For air quality and meteorological modeling, MMS needs to gain a deeper understanding of the atmospheric process and to define the state of atmospheric conditions and Sea State. The data are needed for improving the air quality modeling such as NO_x and SO_x and ozone formation as well as assessing the environmental impacts from the oil and gas operations in the Gulf of Mexico Region.

Revised date: 2/8/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDY PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive Procurement

Title: *Deepwater Program:* Increasing the Understanding of Gas Hydrates for Model Calibration

Period of Performance: 3 Years

Description:

Background Gas hydrates are cage-like structures of water with methane or other small gas or hydrocarbon molecules entrapped that form under low temperature and high pressure conditions. The thermodynamic conditions of pressure and temperature suggest that hydrate should readily form at water depths greater than 300- 400 m. However, observations of gas escaping from sediments do not show the formation of hydrates, unless captured in an inverted sampling tube. Model predictions from incidents of gas release during oil and gas exploration and development activities suggest that hydrates should form, though results from a recent experimental release of gas in deepwater did not indicate the presence of hydrates.

One potential reason for the discrepancy between experimental observations and model results is the requirement that nucleation be initiated by some mechanism before the hydrates form. Several laboratory studies have indicated that nucleation is key to hydrate formation, even under the ideal temperature and pressure conditions. A recent presentation at the Geological Society of America indicated that nucleation was important for the formation of hydrates in marine sediments.

Although observations are reported that suggest nucleation is an important process, little information has been gathered to demonstrate that it is key to the formation and presence of hydrates in the deep ocean. In addition, methods for modeling nucleation processes do not exist.

This study will include laboratory experiments that directly address the nucleation process and conditions that control the process. In addition, the possibility of mathematically describing the process will be explored.

Objectives The objectives of this study are to: 1) increase the understanding of the nucleation process in hydrate formation and 2) develop mathematical techniques to describe the process so that it can be included in models.

Methods Laboratory experiments will be designed to specifically address hydrate nucleation processes.

Products A final report.

Importance to MMS The understanding of nucleation processes in the formation of hydrates is key to model development of hydrate formation in the deep ocean. The MMS will need this information to aid in assessment of hydrate location through a better understanding of the conditions under which the hydrates form.

Date Information Required: The information is needed to assist in the development of hydrate formation models that are presently included in the understanding of incidents involving the release of gas in deepwater.

Revised date: 10/22/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: Risk of Vessel Collisions with Facilities and Proximity to a Shipping Fairway

Period of Performance: 2 Years

Description:

Background Recent years have seen increased production occurring from deepwater leases. As a result, larger platforms having new configurations have been installed in deepwater. In addition, host facilities have been designated and/or installed on the shelf to handle any number of subsea wells. The safety of these types of platforms from vessel traffic has come up on several occasions. The opinion has been expressed that some of the newer facility configurations may offer a potential risk of a larger volume spill as a result of a vessel collision due to the facility's design. Due to a number of near misses, operators of some of these facilities have requested that the USCG permit safety zones around their platforms.

Past cursory examination of historical data from MMS' records regarding vessel collisions with platforms has shown that there may be a link to vessel/platform collision occurrence with a platform's proximity to a shipping fairway or anchorage area. It is difficult to make a definitive connection; however, because the mapped shipping fairway locations have changed over the years. In addition, the MMS historical database does not include all of the information necessary to conduct a comprehensive study on vessel/platform collisions due to changes in the agency's methods for recording these events throughout the years.

Objectives The objective of this study would be to determine the risk factors that could result in a vessel/facility collision, determine the risk of vessel/facility collision, and provide recommended mitigations such as a recommended distance for such facilities from shipping fairways and/or anchorage areas that would prevent vessel collisions and near misses in the future. The study would include: 1) a review of all existing databases having information on vessel/OCS facility collisions; 2) the development and analysis of a compiled database of these events, 3) a literature review of historical shipping fairway locations; 4) an examination of types of vessels involved and the cause of the historic collisions; 5) an examination of the vulnerability of the new deepwater and host platform configurations to vessel collisions to help determine whether one type of facility is more vulnerable to a large spill event than another; 6) a comparison of historical shipping fairway locations to vessel/platform collision reports; and 7) the development of recommended measures that would prevent, reduce, or mitigate vessel/platform collisions.

Methods Literature review and review of existing databases. Development of a database for this project that can be updated by MMS personnel in the future.

Products ITM sessions, a final report and a functional database that can be updated by MMS personnel in the future.

Importance to MMS Safety of a facility, oil and gas exploration and development personnel, and the potential prevention of pollution are always of utmost importance to MMS. This information is also an important factor in understanding and analyzing the potential for a spill to occur as a result of deepwater activity in NEPA documents such as EAs and EISs. MMS policy for approval of the placement of these structures may be altered as a result of this study.

Date Information Required: The information is needed to analyze a proposed action in NEPA documents.

Revised date: 2/6/02

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: The Environmental Risks of Offshore OCS Waste Subsea Disposal

Period of Performance: 1 Year

Description:

Background The Minerals Management Service is reviewing the potential for large-scale, commercial disposal of oilfield wastes by subsea emplacement of these wastes into salt domes and into abandoned wells. Currently, operational wastes from oil and gas operations are usually discharged overboard or transported onshore for disposal in state-regulated “NOW” (non-hazardous oil field waste) commercial waste disposal sites. Issues to be considered include both offshore aspects of cavern integrity requirements and offshore operations as well as transportation and onshore operations associated with subsea commercial disposal.

Objectives This study will: 1) project and characterize different alternatives that could occur for waste disposal of OCS waste (onshore disposal will be one alternative); 2) determine the economic feasibility of each alternative; 3) determine the major impact –producing factors associated with each alternative; 4) characterize a worse case and most likely waste spill event(s) for each alternative; 5) analyze the potential impacts from such event(s); 6) characterize a worse case and most likely accidental release of wastes already stored subsea for each alternative; 7) analyze the potential impacts from such an event; 8) characterize a worse case discharge and most likely oil spill event(s) from each alternative; 9) analyze the potential impacts from such event(s); 10) analyze other water quality and non-water quality environmental consequences that could result from each alternative for offshore waste disposal operations; and 11) compare environmental consequences of analyzed offshore waste disposal with current waste disposal practices.

Methods The contractor will: 1) gather historical data on waste disposal practices on how oilfield wastes not discharged overboard are managed, determining most likely storage and shipment quantities and modes, field and facility testing requirements, total waste volumes and characteristics both for each waste type and likely waste mixtures, onshore and current offshore disposal practices; 2) project the risk of spills occurring based on fault-tree analysis as well as an analysis of historical spill information; and 3) use models that estimate the fate and effects of spilled waste and oil.

Products A final report.

Importance to MMS This information is necessary to the Minerals Management Service to provide us with risk information needed for us to make decisions on approval of industry-proposed offshore waste disposal operations.

Date Information Required: The information will be used for future proposals of offshore disposal in salt caverns.

Revised date: 2/25/2002

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2003-2005

Region: Gulf of Mexico OCS Region

Planning Area(s): Gulfwide

Type: Competitive

Title: Improved Environmental Data Concerning Support Vessel Usage by the OCS Oil and Gas Industry

Period of Performance: 1 Year

Description:

Background Approximately 24 types of service vessels cater to the OCS oil industry. These vessels produce noise above and under water, discharge routine wastes and bilge waters, air emissions, make waves that erode channel banks, and disturb the seafloor with anchors. In particular, they have been responsible for an increasing number of collisions and are viewed by the public as a potentially significant cause of oil spills. Deepwater OCS activities have resulted in an increased demand for service vessels and particularly those qualifying for deepwater operations. As industry moves into deeper waters, larger vessels with deeper drafts have been phased into service. Deeper access channels are needed for these vessels to reach shorebases. These vessels may carry different and more types and increased volumes of equipment and supplies in their hulls. The types and amounts of discharges and potential spills from these larger vessels should be analyzed. Navigation channel usage is currently being summarized by the U.S. Army Corps of Engineers for the MMS and can serve for analysis of channel usage. Of particular concern, information on accident occurrences that have resulted in environmental or economic damage and oil spills is unavailable.

Objectives The objectives of this study are to:

- 1) Assist the MMS in evaluating ongoing and future environmental impacts from OCS service vessel usage
- 2) Provide statistical support to the MMS by determining the rate, size, locations, and causes of associated accidents (oil spills and collisions) occurring due to OCS service vessel usage and compared to local and regional vessel traffic patterns
- 3) Determine the effect deepwater operations will have on service vessel usage and associated impacting factors

Methods The contractor will analyze: 1) historical data on service vessel usage, impact events, and routine effects to the environment and 2) conduct a fault tree analysis to determine the variables of concern relevant to service vessel usage.

Products The study will document the frequency and types of activities of OCS service vessels and the major impacting factors associated with service vessel usage. It will determine navigation usage patterns for existing and future OCS service vessels. It will project the level of expected impact or risk from these factors and how these factors vary with water depth and type of facility servicing, and will develop estimates of collision and spill rates.

Importance to MMS In preparing Environmental Impact Statements and Environmental Assessments, impacts due to support vessels is evaluated. Presently, this information is limited and out of date.

Date Information Required: The information is needed for the preparation of Environmental Impact Statements and would be used as soon as it is available.

Revised date: 2/25/2002

SECTION 3.

3.0 Topical Areas for FY 2005

The GOMR is expecting a continuation of the increase in offshore oil and gas activities it is currently experiencing. Issues that may result in future studies include industry's accelerated move into deepwater; platform removals (including rigs-to-reefs issues); biotechnology; invasive species; and understanding the chronic sublethal impacts associated with offshore development and production, that is, fates and effects.

3.1. Deepwater

Deepwater habitats are the least understood marine environments of the Gulf of Mexico. Several major deepwater studies were initiated in 2000 to broaden our limited knowledge base of the benthic ecology. There is also growing evidence that deep-sea corals are foundation species for their associated biological communities and that these communities are inadequately conserved, partly as a result of lack of information on the importance of these corals. Deep *Lophelia* reefs are currently being studied off the coast of Scotland with reference to their sensitivity to oil and gas activities.

The study of chemosynthetic communities in the northern Gulf of Mexico has essentially been limited to water depths of less than 1000 m due to limitations and availability of research submersibles. With the capabilities for oil and gas exploration and development now extending into the deepest parts of the Gulf of Mexico (3,800 m), the future of chemosynthetic community research should also proceed into those depths. There has been some progress in correlating acoustic geophysical signals with the potential existence of communities but this method remains imprecise. A study of how major and persistent seeps correlate with high density chemosynthetic communities could be performed throughout the entire depth range of the Gulf using now readily available deep-water ROVs. A program to utilize the only manned submersible capable of reaching 3000 m depths (*Alvin*) could also be a major component of a new initiative to fully understand the association of thriving communities and seeps below 1000 m. A broader general objective would be the discovery, description, and understanding of deep chemosynthetic communities.

3.2. Platform Removal

In the Gulf of Mexico, retired platforms are either taken ashore to be reused and recycled or turned over to a State for use in its artificial reef program. Platform removal and disposal will continue to present challenges to the MMS. Initial study efforts concentrated on the impact of explosive platform removals on marine mammals and turtles and, more recently, to fisheries resources. However, the next ten years will see an accelerated rate of removal leading to questions concerning the dismantling of the world's largest artificial reef system.

A number of studies investigating the biological/ecological nature of standing structures are currently being conducted through the GOMR CMI (Table 3.1). These are providing information on the abundance and distribution of key species, and the survival and recruitment of juvenile and larval fishes at platforms. More recently, discussions between MMS and its coastal State partners have identified “partial” removals and the “value” of the artificial reef effect in deepwater as issues that need to be resolved. Thus, as lease abandonment activities continue, artificial reef programs expand, and the industry continues its development of deepwater leases, MMS will be required to expand its knowledge base regarding platform removals.

Table 3.1

Selected Ongoing Coastal Marine Institute Projects

The Influence of Offshore Platforms on Food Availability to Pelagic Fish Populations

Gulf Drilling Platforms as an Environmental Asset: Long-Term Artificial Reefs and Sites for Coral Recruitment

The Effects of Depth and Location on the Composition of the Nekton Community Associated with Petroleum Platforms in the Northern Gulf of Mexico

Comparison of the Assemblage of Organisms at Two Artificial Reefs and a Production Platform in the Northern Gulf of Mexico

Offshore Petroleum Platforms: Functional Significance of Larval Fish Across Longitudinal and Latitudinal Gradients

Potential Spatial and Temporal Vulnerability of Pelagic Fish Assemblages in the Gulf of Mexico to Surface Oil Spills Associated with Deepwater

Mapping Areas of Hard Bottom and Other Important Bottom Types: Outer Continental Shelf and Upper Continental Slope

Evaluation of Oil and Gas Platforms on the Louisiana Continental Shelf for Organisms with Biotechnology Potential

Improving the Predictive Capability of 3D Seismic Surface Amplitude Data for Identifying Chemosynthetic Communities Sites

3.3. Bioprospecting on OCS Platforms

Presently, MMS, in partnership through the CMI with LSU and the University of California - Santa Barbara, is conducting studies to examine the availability and distribution of bioharvestable marine organisms that occupy OCS platforms and chemosynthetic communities. Concerns for continued overall protection of chemosynthetic communities and the levels of sustainable harvest of platform community components will be a component in the development of these potential new resources.

One day soon the search for oil and gas on the OCS will be joined by the search for genetic and biochemical resources found in marine organisms growing on platforms and in chemosynthetic communities. This "bioprospecting" or "biomining" may produce new therapeutic drugs for fighting cancer, AIDS, or heart disease. Many of DOI's bureaus are coming to terms with the possibility of locating, conserving, and licensing the natural products of their trust resources. MMS has had a long history of studying the ecology of platforms. As part of these studies, many species of algae, hydroids, sponges, and barnacles have been identified with several candidates producing therapeutic natural products. One candidate organism, the bryozoan, *Bugula neritina*, lives in the Gulf and potentially can be commercially harvested from platforms. This organism produces a chemical, Bryostatin 1, which is in Phase II trial testing as a treatment against non-Hodgkin's lymphoma and chronic leukemia. If the platforms can be shown to be a ready source for this organism, then MMS may be dealing with this emerging issue in a significant way.

3.4. Invasive Species

Invasive species (meaning not native to but arriving, establishing, and spreading) are introduced into the Gulf of Mexico as: 1) fouling and boring organisms on semi-submersible exploratory drilling rigs originating from locations outside the Gulf; 2) encrusting fouling, and boring species on artificial reef material towed into the GOM from another area; 3) fouling and boring organisms on ships; 4) organisms contained in ballast seawater from ships; 5) imports of live shellfish sold in seafood markets; and 6) non-native fisheries introductions.

Oil and gas platforms are facilitating the range extension of several species (the barnacle *Tetraclita stalactifera stalactifera*, the yellowtail snapper *Ocyurus chrysurus*, the brown mussel *Perna perna*). The platforms, used as "stepping stones", are allowing native and invasive species to be introduced to new places, which could cause significant changes in the ecological roles of each of these species. The Australian spotted jellyfish, *Phyllorhiza punctata*, was seen in tremendous concentrations during the summer of 2000 as was another invasive jelly, *Drymonema dalmatina*. Both of these invasive species appear to have come into the Gulf from Caribbean waters. These unusually high jellyfish densities raise a number of concerns. Fishermen have experienced damage to equipment due to large numbers of jellies in their nets. The jellyfish are very efficient filter feeders and their primary food source is plankton. The jellyfish concentrations were in prime locations to feed on the planktonic larvae and eggs of shrimp, crabs and many important fish species that spawn offshore as they drifted on the currents to inshore nursery areas of the Sound. The role of artificial structures and reefs in enhancing the abundance of invasive species will continue to be an area of interest.

3.5. Fates and Effects Studies

The OCS supports large and valuable commercial and recreational fisheries, and concern has been expressed that the oil and gas industry may contaminate these resources or the supporting ecosystem. Understanding the chronic, sublethal impacts that may be associated with offshore oil and gas activities is a concern to many. Questions

continually arise as industry moves into deeper water and applies new technology. The studies program is continuously addressing the information needs in this constantly evolving area and will develop new studies as the need arises.

3.6. Seismic Activity in the Gulf of Mexico

The effect of seismic surveys on the marine environment has become a growing concern within the environmental, scientific, and regulatory communities. Increasing information about “noise in the ocean”, impacts on marine mammals and sea turtles, and recent military activities have highlighted the need for MMS to address sound producing activities that it regulates. While the events that have triggered this concern are mostly military activities, all sources of marine noise are now "suspect" including commercial shipping, offshore drilling and seismic surveys.

Examples of the scrutiny seismic surveys have been undergoing include marine seismic surveys proposed by the U.S. Geological Survey (USGS) for hazard assessment (non-oil and gas) off California that were cancelled due to controversy and an inability to reach a compromise on permitting conditions with the State.

In June 1998, an international conference on marine mammals and the effects of seismic activities was held in London. One result of the conference was to propose guidelines for conducting seismic surveys. The Marine Mammal Commission (MMC) now hosts periodic multi-agency meetings, the Interagency Coordinating Group on Acoustics (ICGA), to discuss issues related to sound and explosive pressure wave effects. NMFS is preparing new guidelines to define acoustic "takes" under the Marine Mammal Protection Act (MMPA) and the MMC has taken a position that seismic surveys represent a take situation.

In view of these trends, additional studies to assess the potential effects of seismic exploration in the Gulf are a priority and future protected species studies now must consider acoustic effects as a significant information need. To determine whether G&G activities have significant environmental impact, as defined under NEPA, the MMS contracted for a programmatic Environmental Assessment (EA) on “Geological and Geophysical (G&G) Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf (OCS)”. The EA is in the final stages of review and covers all aspects of G&G exploration with particular emphasis on seismic operations.

Depending on the results of the EA, additional research may need to be pursued through the Environmental Studies Program. Additional research would facilitate Endangered Species Act (ESA) consultations MMS must enter into with the National Marine Fisheries Service and MMS petitions for rulemaking under the MMPA authorizing unintentional, incidental take of marine mammals during seismic survey activities. In order for MMS to be authorized for incidental take of threatened or endangered marine mammals under the ESA, there must first be regulations issued under the MMPA.

SECTION 4.

4.0 Literature Cited

Carney, R.S. 1997. Workshop on Environmental Issues Surrounding Deepwater Oil and Gas Development, Final Report. OCS Study MMS 98-0022. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 163 pp.